The medical profession, and particularly cardiologists, have recognized that the acoustic signals from a heartbeat are not simply the "lub-dub" sounds familiar to lay individuals. More particularly, medical specialists have recognized the significance of the cadence, rhythm, and relationship between particular components of the heart sound, which are medically referred to as the S1, S2, S3, and S4 components of the heartbeat. While each of these component sounds in turn can have fluctuations functionally dependent upon the respiratory cycle of the individual, the characteristic frequency of these components is not significantly affected by this respiratory cycle. During both inspiration and expiration, the characteristic frequency of the S1 and S2 components for a healthy heart is normally in the range of from 110 cps to 120 cps, while the characteristic frequency of the S3 component is in the range of from 70 cps to 90 cps. The S4 component can be inaudible to humans using a normal stethoscope for a patient less than 50 years old, although there is no reason to believe that the S4 component, which is generally in the range of 50 cps to 70 cps, is not detected by mosquitoes. As indicated above, evidence has shown that mosquitoes are strongly attracted to individuals with a damaged heartbeat, and the medical profession has studied in depth the timing, configuration, and duration of heart murmurs. While certain murmurs have a relatively low frequency in the range of from 60 cps to 100 cps, heart murmurs more often are in the medium-frequency range of from 100 cps to 250 cps, or are in the higher frequency range of more than 300 cps associated with "blowing."

The above evidence suggests that mosquitoes will be attracted to acoustic signals in the range of from 50 cps to 120 cps, and will be strongly attracted to its acoustic signals in the range of from about 150 cps to about 350 cps. Applicants presently believe that one or more frequencies in the range of 150 cps to 250 cps together with one or more frequencies in the range of peak in the 300 cps to 500 cps range comprise the best signal for attracting mosquitoes.

Discrete "ejection sounds" or clicks associated with a damaged heart have a frequency in the 160 to 180 cps range, and these clicks also can be a reason that mosquito are particularly attracted individuals with damaged hearts. We determined that mosquitoes are attracted to sound waves from an acoustic speaker that replicates the sounds of a heartbeat, and thus signals within the frequency range described above would preferably be output from a speaker in accordance with the "lub-dub" rhythm and cadence associated with a heartbeat.

The method of the present invention is suggested by the apparatus disclosure above. The method for attracting bloodsucking insects, such as mosquitoes, to an attractant zone comprises generating a source of electrical energy, generating control signals powered by the source of electrical energy, and generating acoustic waves simulating a human heartbeat in response to the control signals for attracting insects to an attractant zone. If desired, the insects can be eradicated once attracted to the zone utilizing the techniques described above. The device of this invention requires little if any maintenance, and can be reliably installed and utilized by relatively inexperienced personnel.

It should be noted that no one set of critical or design factors will work well for all blood-sucking insects. The parameters for attracting insects can change from location to location and with the seasons and time of day. The present invention, however, allows for ready modification of the control station placement and operational parameters in a quick and inexpensive way. For example, all control stations can be adjusted from the central location, and the performance of one relative to others can be adjusted by way of the valves **390**.

By setting the signature of the heartbeat sound to mimic the heartbeat of a natural predator, birds and other nuisance animals can be repelled. The proper acoustical signature can be achieved in a variety of ways including a combination of shape, size, thickness, coatings and additives (e.g., pigments, fibers, etc.). A sound-scarecrow can be established to repel, for example, birds, rats, rabbits, deer and racoons from a garden or farm to protect crops and grain/food intended for consumption by farm animals. The heartbeat sound of dogs, foxes, cats and bobcats, for example, can be used to repel a variety of nuisance animals. The repelling heartbeat sound should cycle so that it becomes louder and more rapid in such a manner as to prevent pests from becoming adapted to the heartbeat sound. Such a control station can be mounted on a vehicle to repel animals (e.g., deer from a road as a vehicle approaches the animals.

Tubing that contains air or gas is still hollow. Tubing is hollow even if it has caps or stops at one or both ends.

Various changes and modifications will become apparent from the foregoing discussion, and are considered within the scope of the invention. Such changes and modifications should be understood as being within the scope of this invention, which is limited only by the claims attached hereto.

We claim:

1. An insect control station comprising:

(a) a digital signal processor (DSP) programmed with an algorithm which generates a prescribed analog signal;

(b) a speaker connected to receive the prescribed analog signal from the DSP and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat;

(c) a resonator positioned in the path of the delivered acoustic energy; and

(d) a gluey surface supported on the control station.

2. The insect control station as in claim **1**, wherein the gluey surface is supported on or proximate to the resonator.

3. The insect control station as in claim **1**, wherein the acoustic energy comprises acoustic waves in the range of from 20 cps to 500 cps.

4. The insect control station as in claim **1**, further comprising circuitry to repeatedly deliver a strobe signal to the DSP.

5. The insect control station as in claim **4**, wherein the DSP delivers one of a plurality of prescribed analog signals in response to the strobe signal.

6. The insect control station as in claim **5**, wherein the prescribed analog signals are each simulative of at least a portion of a heartbeat.

7. An insect control station comprising:

(a) a digital signal processor (DSP) programmed with an algorithm which generates a prescribed analog signal;

(b) a speaker connected to receive the prescribed analog signal from the DSP and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat;

(c) a resonator positioned in the path of the delivered acoustic energy; and

(d) a pesticide supported on the control station.

8. The insect control station as in claim **7**, wherein the pesticide is supported on or proximate to the resonator.

9. An insect control station comprising:

(a) a memory which stores a digitized audio sample and delivers the digitized audio sample in response to a strobe signal;

(b) a digital to analog converter (DAC) having an input communicatively coupled to the memory and an output that outputs analog signals;

(c) a speaker connected to receive the analog signals from the DAC and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat;

(d) a resonator positioned in the path of the delivered acoustic energy; and

(e) a gluey surface supported on the control station.

10. The insect control station as in claim **9**, wherein the gluey surface is supported on or proximate to the resonator.

11. An insect control station comprising:

(a) a memory which stores a digitized audio sample and delivers the digitized audio sample in response to a strobe signal;

(b) a digital to analog converter (DAC) having an input communicatively coupled to the memory and an output that outputs analog signals;

(c) a speaker connected to receive the analog signals from the DAC and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat; and

(d) a resonator positioned in the path of the delivered acoustic energy; and

(e) a pesticide supported on the control station.

12. The insect control station as in claim **11**, wherein the pesticide is supported on or proximate to the resonator.

13. An insect control station comprising:

(a) a digital signal processor (DSP) programmed with an algorithm which generates a prescribed analog signal;

(b) a speaker connected to receive the prescribed analog signal from the DSP and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat;

(c) a resonator positioned in the path of the delivered acoustic energy;

(d) tubing between a support base and the speaker with the resonator seated proximate to the speaker; and

(e) a source of negative pressure connected to the tubing, the control station having an inlet proximate the resonator sized to receive insects that are drawn through the inlet in response to negative pressure.

14. An insect control station comprising:

(a) a memory which stores a digitized audio sample and delivers the digitized audio sample in response to a strobe signal;

(b) a digital to analog converter (DAC) having an input communicatively coupled to the memory and an output that outputs analog signals;

(c) a speaker connected to receive the analog signals from the DAC and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat; and

(d) a resonator positioned in the path of the delivered acoustic energy wherein the resonator responds to the acoustic energy from the speaker with vibrations that define an attractant zone, the insect control station further comprising an eradication mechanism positioned proximate to or within the attractant zone wherein the eradication mechanism includes a detector to detect the presence of an insect within the attractant zone, the eradication mechanism being activated in response to detection of the insect.

15. The insect control station as in claim **14**, wherein the eradication mechanism, when activated, delivers a pesticide into the attractant zone.

16. An insect control station comprising:

(a) a memory which stores a digitized audio sample and delivers the digitized audio sample in response to a strobe signal;

(b) a digital to analog converter (DAC) having an input communicatively coupled to the memory and an output that outputs analog signals;

(c) a speaker connected to receive the analog signals from the DAC and to deliver acoustic energy;

(d) a resonator positioned in the path of the delivered acoustic energy;

(e) an amplifier connected between the DAC and the speaker; and

(f) a source of negative pressure connected to the tubing, the control station having an inlet proximate the resonator sized to receive insects that are drawn through the inlet in response to negative pressure.

17. The insect control station as in claim **16**, further comprising tubing between the speaker and the resonator, the tubing defining the path for delivery of the acoustic energy.

18. The insect control station as in claim **17**, wherein the tubing includes an exterior surface having a striped pattern supported thereon, the pattern serving to attract insects to the control station.

19. The insect control station as in claim **18**, wherein the tubing has air intake holes and air outflow holes, the control station further comprising an element positioned within the tubing that produces heat in response to the passage of current therethrough, the air intake holes and air outflow holes being arranged relative to the heat-producing element to establish convection currents of heated air when heat is being produced by the heat-producing element.

20. The insect control station as in claim **16**, further comprising tubing between a support base and the speaker with the resonator seated proximate to the speaker.

21. The insect control station as in claim **20**, wherein the tubing includes an exterior surface having a striped pattern supported thereon, the pattern serving to attract insects to the control station.

22. The insect control station as in claim **16**, wherein the acoustic energy is simulative of at least a portion of a heartbeat.

23. The insect control station as in claim **22**, wherein said mechanism is a killing mechanism comprising an eradication mechanism positioned proximate to or within the attractant zone.

24. The insect control station as in claim **22**, wherein the acoustic energy comprises acoustic waves in the range of from 20 cps to 500 cps.

25. The insect control station as in claim **16**, further comprising circuitry to repeatedly deliver the strobe signal to the memory.

26. The insect control station as in claim **25**, wherein the memory includes at least two segments, each segment storing a respective digitized audio sample.

27. The insect control station as in claim **26**, further comprising a controller connected to the memory to govern which segment of the memory is accessed and which digitized audio signal is delivered in response to the strobe signal.

28. The insect control station as in claim **26**, further comprising a selector connected to the controller, the selec-

tor permitting manual selection of the digitized sample to be delivered to the DAC.

29. The insect control station as in claim 26, wherein the digitized audio sample stored in each segment of the memory is simulative of at least a portion of a heartbeat.

30. The insect control station as in claim 16, further comprising a fluid outlet for delivering from the control station one or more feeding stimulants selected from the group of: carbon dioxide, heat, acetone, lactic acid, octenol, a byproduct of respiration and a byproduct of digestion.

31. An insect control station comprising:

(a) a digital signal processor (DSP) programmed with an algorithm which generates a prescribed analog signal;

(b) a speaker connected to receive the prescribed analog signal from the DSP and to deliver acoustic energy wherein the acoustic energy is simulative of at least a portion of a heartbeat;

(c) a resonator positioned in the path of the delivered acoustic energy; and

(d) tubing between a support base and the speaker with the resonator seated proximate to the speaker wherein the tubing has air intake holes and air outflow holes, the control station further comprising an element positioned within the tubing that produces heat in response to the passage of current therethrough, the air intake holes and air outflow holes being arranged relative to the heat-producing element to establish convection currents of heated air when heat is being produced by the heat-producing element.

32. The insect control station as in claim 31, wherein the resonator responds to the acoustic energy from the speaker with vibrations that define an attractant zone, and further comprising an eradication mechanism positioned proximate or within the attractant zone.

33. The insect control station as in claim 32, wherein the eradication mechanism includes a detector to detect the presence of an insect within the attractant zone, the eradication mechanism being activated in response to detection of the insect.

34. The insect control station as in claim 33, wherein the eradication mechanism, when activated, delivers a pesticide into the attractant zone.

35. The insect control station as in claim 31, further comprising a mechanism for delivering from the tubing one or more feeding stimulants selected from the group of: carbon dioxide, heat, acetone, lactic acid, octenol, a byproduct of respiration and a byproduct of digestion.

36. The insect control station as in claim 35, further comprising an amplifier connected between the DSP and the speaker.

37. An insect control station comprising:

(a) a memory which stores a digitized audio sample and delivers the digitized audio sample in response to a strobe signal;

(b) a digital to analog converter (DAC) having an input communicatively coupled to the memory and an output that outputs analog signals;

(c) a circuit to repeatedly deliver the strobe signal;

(d) an amplifier connected to the output of the DAC;

(e) a speaker connected to receive the analog signals from the amplifier and to deliver acoustic energy that is simulative of at least a portion of a heartbeat;

(f) tubing positioned between a support base and the speaker;

(g) a resonator positioned in the path of the delivered acoustic energy, the resonator presenting a surface that vibrates in response to the acoustic energy and which can support a pesticide or gluey substance for controlling a local insect population; and

(h) a source of negative pressure connected to the tubing, the control station having an inlet proximate the resonator sized to receive insects that are drawn through the inlet in response to negative pressure.

38. The insect control station as in claim 37, further comprising a pesticide supported on the control station.

39. The insect control station as in claim 37, further comprising a gluey substance supported on the control station.

40. The insect control station as in claim 37, further comprising a mechanism for delivering from the tubing one or more feeding stimulants selected from the group of: carbon dioxide, heat, acetone, lactic acid, octenol, a byproduct of respiration and a byproduct of digestion.

41. The insect control station as in claim 37, wherein the tubing has air intake holes and air outflow holes, the control station further comprising an element positioned within the tubing that produces heat in response to the passage of current therethrough, the air intake holes and air outflow holes being arranged relative to the heat-producing element to establish convection currents of heated air when heat is being produced by the heat-producing element.

42. The insect control station as in claim 37, wherein the tubing includes an exterior surface having a striped pattern supported thereon, the pattern serving to attract insects to the control station.

43. The insect control station as in claim 37, wherein the memory includes at least two segments each storing a respective digitized audio sample and wherein the circuit includes a controller that is configured to govern which segment of the memory is accessed and which digitized audio signal is delivered in response to the strobe signal.

44. The insect control station as in claim 43, further comprising a selector connected to the controller, the selector permitting manual selection of the digitized sample to be delivered to the DAC.

45. An insect control station comprising:

(a) a memory which stores a digitized audio sample and delivers the digitized audio sample in response to a strobe signal;

(b) a digital to analog converter (DAC) having an input communicatively coupled to the memory and an output that outputs analog signals;

(c) a circuit to repeatedly deliver the strobe signal;

(d) an amplifier connected to the output of the DAC;

(e) a speaker connected to receive the analog signals from the amplifier and to deliver acoustic energy that is simulative of at least a portion of a heartbeat;

(f) tubing positioned between a support base and the speaker wherein the tubing has air intake holes and air outflow holes, the control station further comprising an element positioned within the tubing that produces heat in response to the passage of current therethrough, the air intake holes and air outflow holes being arranged relative to the heat-producing element to establish convection currents of heated air when heat is being produced by the heat-producing element; and

(g) a resonator positioned in the path of the delivered acoustic energy, the resonator presenting a surface that

vibrates in response to the acoustic energy and which can support a pesticide or gluey substance for controlling a local insect population.

46. The insect control station as in claim 45, wherein the tubing includes an exterior surface having a striped pattern supported thereon, the pattern serving to attract insects to the control station.

47. The insect control station as in claim 45, further comprising a source of negative pressure connected to the tubing, the control station having an inlet proximate the resonator sized to receive insects that are drawn through the inlet in response to negative pressure.

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